a detector for detecting the position of said rotor, by detecting a current or voltage of said excitation winding which changes with different phase in response to the motion of said rotor; wherein

each of said excitation windings is wound on each of the excitation teeth for a pair of adjacent excitation teeth such that the magnetic flux through each of the paired excitation teeth has directions opposite to each other, and said excitation windings for a pair of excitation teeth are connected in series;

excitation teeth are provided on said stator so that the pitch of each excitation tooth for each pair of adjacent excitation teeth equals an integral multiple of the pitch of the magnetic salient sections of the rotor; and

both excitation teeth in each pair of excitation teeth have the same phase for magnetic resistance change with respect to the motion of the rotor.

REMARKS

Claims 1 and 2 are pending. By the Request for Approval of Drawing Corrections and this Amendment, Figures 3-5 and claim 2 have been amended. No new matter has been added. Reconsideration in view of the above amendments and following remarks is respectfully requested.

The attached Appendix includes a marked-up copy of the rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Figures 3-5 were objected to under MPEP §608.02(g). Figures 3-5 have been amended to include a legend --Related Art-- responsive to the objection. It is respectfully requested the objection be withdrawn.

Claim 1 was rejected under 35 U.S.C. §102(b) over Applicant's alleged admitted prior art (AAPA). The rejection is respectfully traversed.

Applicant respectfully asserts the AAPA fails to teach a reluctance type resolver comprising a stator having a plurality of excitation teeth, each of which is wound by an excitation winding so that the magnetic fluxes through all excitation teeth have the same direction and the stator includes bypass magnetic path teeth passing a magnetic flux having a direction opposite to the direction of said excitation teeth as recited in Applicant's claim 1.

In contrast, as shown in Applicant's Figure 3, the AAPA has windings 12-19 around every tooth of the resolver (page 1, lines 20-23 of Applicant's specification). Applicant's claimed invention is thus advantageous over the AAPA because the resolver recited in Applicant's claim 1 has excitation winding around each excitation teeth and does not have winding around the bypass magnetic path teeth. Further, Applicant's claimed resolver is advantageous by providing bypass magnetic path teeth which allow the excitation windings to be wound in directions that are less prone to the leakage magnetic flux. Therefore, Applicant's resolver allows the velocity of a rotor to be detected with better precision and thus overcomes the deficiencies of the AAPA when a winding is provided for every tooth. For at least these reasons, Applicant respectfully submits the AAPA fails to teach all the features of Applicant's claim 1. It is respectfully requested the rejection be withdrawn.

Claim 2 was rejected under 35 U.S.C. § 103(a) over the AAPA in view of Kitazawa, U.S. Patent No. 5,757,182. The rejection is respectfully traversed.

Applicant respectfully submits neither the AAPA nor Kitazawa, either alone or in combination, teach, disclose or suggest a reluctance type resolver comprising a stator, having a plurality of excitation teeth, each of which is wound by an excitation winding, a rotor having magnetic salient sections that are placed to oppose said excitation teeth, and a detector for detecting the position of said rotor, by detecting a current or voltage of the excitation winding which changes with different phase in response to the motion of said rotor, wherein each of the excitation windings is wound on each of the excitation teeth for a pair of adjacent

excitation teeth such that the **magnetic flux through each of the paired excitation teeth has directions opposite to each other**, the **excitation windings for a pair of excitation teeth are connected in series** and excitation teeth are provided on the stator so that the pitch of each excitation tooth for each pair of adjacent excitation teeth equals an integral multiple of the pitch of the magnetic salient sections of the rotor and both excitation teeth in each pair of excitation teeth have the same phase for magnetic resistance change with respect to the motion of the rotor as recited in Applicant's claim 2.

Applicant's claimed resolver is advantageous by providing a resolver in which the excitation windings for a pair of excitation teeth are connected in series and thus, two excitation teeth in each pair have the same phase for magnetic resistance change with respect to the motion of the rotor and the total sum of the magnetic flux through the two paired excitation teeth is zero. Accordingly, Applicant's claimed resolver teaches two excitation teeth in each pair which have the same phase for permeance change and thus, approximately equal leakage magnetic flux goes through each of the excitation teeth in a pair. Therefore, the noise currents cancel each other out because the noise currents generated at each of the two excitation windings in each pair are at approximately the same magnitude but in opposite directions.

Instead, the AAPA recites a resolver which comprises a rotor (11) with excitation teeth (2 - 9) in which windings (12-19) are wound in such a manner that magnetic fluxes generated at the excitation teeth (2, 4, 6 and 8) are of opposite direction from the magnetic fluxes generated at excitation teeth (3, 5, 7 and 9) and in which the permeance change with respect to the motion of the rotor (11) between the adjacent windings has a phase which is different by ¼ pitch of the salient section (page 2, lines 13-15 of Applicant's specification). Thus, the leakage magnetic flux which is generated in adjacent excitation teeth would not be approximately the same. Accordingly, although the flux which flows through adjacent teeth

would be of opposite direction because the magnitudes of the leakage magnetic flux are not substantially the same, the arrangement would not be beneficial in reducing the detection error generated by leakage magnetic flux.

In addition, Applicant respectfully submits Kitazawa fails to overcome the deficiencies of the AAPA as discussed above. In particular, Applicant respectfully submits Kitazawa specifically teaches an angle sensor characterized in that the number of the poles (3) of the exciting winding (4) equals to the number of the slots (2) and that the output windings (6 and 7) are wound so that the voltage induced in each one phase winding of the n-phase windings is sinusoidally distributed and that the exciting winding and the output windings are wound in the slots on a one-slot pitch basis in a distributed fashion (col. 2, lines 8-14). Thus, as shown in Figure 6 of Kitazawa, each slot (2) in the sensor disclosed in Kitazawa has an excitation winding which has a phase that is different than the phases of the windings on the slots to which it is adjacent. Accordingly, Kitazawa fails to teach or suggest a pair of excitation teeth with an excitation winding connected in series such that two excitation teeth, i.e. a pair, have an excitation winding of the same phase for permeance change with respect to the motion of the rotor.

For at least these reasons, Applicant respectfully submits the combination of the AAPA and Kitazawa fails to teach, disclose or suggest all the features of Applicant's claim 2. It is respectfully requested the rejection be withdrawn.

In view of the foregoing amendments and remarks, Applicant submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1 and 2 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,

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Registration No. 27,075

Scott M. Schulte
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JAO:MMI/sxb

Attachments:
Request for Approval of Drawing Corrections
Appendix

Date: March 8, 2002

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claim:

2. (Amended) A reluctance type resolver, comprising:

a stator, constructed from a magnetic material, having a plurality of excitation teeth, each of which is wound by an excitation winding;

a rotor having magnetic salient sections that are placed to oppose said excitation teeth; and

a detector for detecting the position of said rotor, by detecting a current or voltage of said excitation winding which changes with different phase in response to the motion of said rotor; wherein

each of said excitation windings is wound on each of the excitation teeth for a pair of adjacent excitation teeth such that the magnetic flux through each of the paired excitation teeth has directions opposite to each other, and said excitation windings for a pair of excitation teeth are connected in series; ~~and~~

excitation teeth are provided on said stator so that the pitch of each excitation tooth for each pair of adjacent excitation teeth equals an integral multiple of the pitch of the magnetic salient sections of the rotor; and

both excitation teeth in each pair of excitation teeth have the same phase for magnetic resistance change with respect to the motion of the rotor.